Remarks

Applicant respectfully request reconsideration of the present application in view of the foregoing amendments and the following remarks. Claims 1-11 are pending in the application.

Patentability Over Cited Art

The Action rejects claims 1-2 and 9-10 under 35 U.S.C. 103(a) as being unpatentable over Sloan ("Precomputed Radiance Transfer for Real-Time Rendering in Dynamic, Low-Frequency Lighting Environments") in view of Heidrich ("Illuminating Micro Geometry Based on Precomputed Visibility") in further of Gardiner (U.S. Pat. No. 5,870,098). The Action also rejects claims 3-8 and 11 under 35 U.S.C. 103(a) as being unpatentable over Sloan ("Precomputed Radiance Transfer for Real-Time Rendering in Dynamic, Low-Frequency Lighting Environments") in view of Heidrich ("Illuminating Micro Geometry Based on Precomputed Visibility") in further of Gardiner (U.S. Pat. No. 5,870,098) in further view of Tong ("Synthesis of Bidirectional Texture Functions on Arbitrary Surfaces"). Applicants traverse the rejections.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. (MPEP § 2142.)

Motivations to combine or modify references must come from the references themselves or be within the body of knowledge in the art. (See, MPEP § 2143.01.)

Claim 1, as amended, recites in part:

> calculating data of meso-scale radiance transfer for area lighting at locations finely sampled over a meso-structure texture patch mapped over a surface of the object, wherein said meso-scale radiance transfer data is parameterized using a low-order spherical harmonic lighting basis;

The other independent claims 4, 9 and 11 also are amended to recite language relating to the meso-scale radiance transfer data being parameterized using a spherical harmonic lighting basis. This feature is discussed in the specification at page 6, line 25 through page 7, line 2

("The PRT and RTT techniques described herein both parameterize appearance by source lighting. Unlike previous fine-scale approaches, they use a low-order spherical harmonic (SH) basis rather than a directional basis"); and at page 10, line 10-22.

The cited art fails to describe or suggest producing meso-scale radiance transfer data with a spherical harmonic lighting basis. Sloan describes a process that precomputes radiance transfer at a single, macro-scale. (See, discussion of Sloan in the Background section of the present application at page 3, line 23 through page 5, line 10.)

Heidrich describes a method of simulating a bidirectional reflectance distribution function (BRDF) using precomputed visibility. Heidrich also is discussed in the Background of the present application at page 2, lines 24-27. Heidrich specifically states that the BRDF uses a directional lighting basis. (See, Heidrich at page 456, right column, last full paragraph ("the BRDF by definition is a function of exactly one incoming direction and exactly one outgoing direction"); and page 458, left column, paragraph following equation (1) ("we have denoted the BRDF as a function of the incoming and outgoing direction as well as surface normal").) Heidrich therefore fails to describe or suggest to produce meso-scale radiance transfer data that is parameterized on a spherical harmonic basis.

Moreover, Sloan actually teaches away from producing meso-scale radiance transfer data parameterized on the spherical harmonic basis. Sloan describes a run-time rendering process using the macro-scale precomputed radiance transfer at section 6, where a BRDF is used (at step 4) to find exit radiance for a glossy surface. This is also remarked on in the Summary of the present application at page 7, lines 12-17. Accordingly, one of ordinary skill in the art following the teachings in Sloan would have used a BRDF, which has a directional lighting basis.

The other art of record, Gardiner and Tong, also fail to describe or suggest representing meso-scale radiance transfer parameterized on a spherical harmonic basis. The Office cites Gardiner for mentioning the term "area lights." However, Gardiner proposes making a simplifying assumption that all light from a global light source is emitted in parallel along a single direction vector. (Gardiner, at column 6, lines 16-25.) Gardiner therefore fails to teach or suggest use of anything different than a directional lighting basis.

Tong, on the other hand, describes the use of bidirectional texture functions (BTFs). The BTF described in Tong is a function of light direction. (See, Tong at page 667, section 3, "Overview.") Again, as mentioned in the Summary of the present application at page 7, lines 5-

10, the RTT data of the described embodiment differs from the existing BTFs by using a spherical harmonic lighting basis and not a directional lighting basis.

For these reasons, the cited art fails to teach or suggest the recited meso-scale radiance transfer data parameterized on a spherical harmonic basis. Independent claims 1, 4, 9 and 11 therefore are clearly allowable over this art. Dependent claims 2-3, 5-8 and 10 likewise should be allowable for at least the reasons discussed concerning their respective parent claims, and recite further limitations believed to render them separately patentable.

Request For Interview

If any issues remain in light of these remarks and amendments, the Examiner is formally requested to contact the undersigned attorney to arrange a telephonic interview. It is believed that a brief discussion of the merits of the present application may expedite prosecution. Applicants submit the preceding formal Amendment and the above remarks so that the Examiner may fully evaluate Applicants' position, thereby enabling the interview to be more focused.

This request is being submitted under MPEP § 713.01, which indicates that an interview may be arranged in advance by a written request.
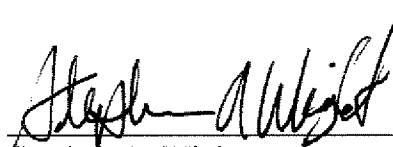
Conclusion

The application should now be in condition for allowance. Such action is respectfully requested.

Respectfully submitted,

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